

extremely variable with us, especially in outlying parts of our islands, where isolation tends to encourage variation. Mr. Barrett's account of the variation of *D. conspersa*, Esper, an unusually widely-distributed species with us, is well worthy of the attention of scientific naturalists, and alone furnishes a sufficient reply to any persons who may imagine that our British Lepidoptera may be regarded as worked out. These notes are too long to reproduce in their entirety, as they extend to nearly two pages; but we may perhaps be allowed to quote a few sentences relative to the variations exhibited by *D. conspersa* in the Scottish islands, the entomology of which has only been systematically investigated within the last twenty years or so.

"It is in the Shetland Isles that the most extraordinary forms are found—the white markings utterly suppressed, or the stigmata alone white, or yellow, or pale ochreous, or black-brown and only indicated by blacker margins; the subterminal line only indicated by its attendant black clouds, and sometimes the whole surface of the fore-wings smoky-black or olive-black, with but a faint dapppling of blacker lines and crescents; on the other hand, some specimens in these islands are of the form in which the ground colour is intensified, but the markings, though curtailed, sharply white. This last form is also found in the West of Ireland, and a specimen now before me from Sligo is singularly rich in its deep dark colour and snowy blotches. Specimens from the Hebrides are extremely beautiful, the white markings variegated with yellow and greenish-yellow, or even orange-yellow. Those from Orkney are somewhat similar, or with the white markings small but, clear. Although there are so many apparently local strains of variation, all are intimately connected by intermediates, so that, except in some degree in Shetland, it is impossible definitely to separate the species into varieties. . . . Mr. McArthur, who has collected very extensively in [the Shetland] Islands, assures me that the darkest suffused and nearly unicolorous forms are found mainly on the East coasts, more particularly of the island of Unst, where the rocks among which the food-plant grows are of a very dark colour; while on the West coast, where the rocks are of a paler colour, the forms found are more nearly normal, with intermediate varieties. Also that in the Hebrides, along with rocks ornamented with yellow lichens, he has found those varieties of the moth having an orange- or olive-yellow tinge. This is the more remarkable in that the moth does not appear there to sit upon the rocks, or to give up its usual habit of hiding in the daytime among herbage."

Another very interesting species of the same genus is *Dianthecia Barrettii*, Doubleday, which was originally captured by Mr. Barrett at the Bailey Lighthouse at the Hill of Howth, near Dublin. It has scarcely been taken anywhere but on this hill, except singly at the Land's End, Ilfracombe, Tenby, Carnarvonshire, and perhaps in the south of Ireland. Mr. Barrett, in common with several other lepidopterists, now regards it as a variety of the continental *Dianthecia luteago*, Hübner, remarking: "There is at first sight no resemblance between them, yet, with the exception of the colour, no distinction of any importance can be found." In the larva the spiracles are said to be black in *D. Barrettii*, and flesh-coloured, encircled with black in *D. luteago*.

But before the identity of the two forms can be taken as established, broods of each should be reared in different larva-cages by the same observer, and the

differences between them carefully noted at each stage. It may be that *D. Barrettii* is only an incipient species at present; but it is equally probable that further observation may show that it is abundantly distinct from *D. luteago*. We incline to think that it is a little premature to class the two forms together, even tentatively, without better evidence.

We hope that Mr. Barrett will succeed in completing the great work on which he has now made such good progress, and which is likely to remain a most valuable record for all time of the state of our knowledge of the British Lepidoptera at the end of the present century. We cannot speak of the plates, as we have only the smaller edition, without illustrations, before us while writing.

W. F. KIRBY.

OUR BOOK SHELF.

A Suggested Improvement of the Current Theories of the Tides. By J. H. S. Moxly. Pp. 43. (London: Rivingtons, 1898.)

IN this brochure, Mr. Moxly expresses his dissatisfaction with the theory of the tides, as ordinarily accepted, and submits an alternative explanation. Although he opposes the views generally held, he does not exhibit that spirit of antagonism and adopt the language of abuse that too frequently disfigures the writings of those who dissent from authoritative teaching. Where it has been necessary to refer to the papers of Airy or of Darwin, these names are generally mentioned with the respect due to their great reputation, and therefore, though we are as thoroughly opposed to Mr. Moxly as he is to the mathematicians just mentioned, we shall endeavour to adopt the same courtesy towards him that he has shown towards others.

The author considers that the tides are heaved up by the earth's gravity. The differential attraction of the sun and moon simply gives an opportunity for the earth's gravity to display itself in this manner. This action is illustrated by reference to a football. When the leathern covering is injured, or a seam gives way, the inner india-rubber case bulges out through the opening in the outer cover. "The pressure of the outer case had been removed from one region of the ball, and the pressure of the part which remained did the rest. This, I take it, is exactly how the pressure of the earth's gravity produces the tide." We are all prepared to admit with the author, that the tide-raising force is directly opposed to the action of the earth's gravity, though we might not adopt his phraseology. But another elementary proposition shows that the tide-raising force varies inversely as the cube of the distance of the disturbing body, and we fail to derive this from the football illustration, or from anything directly asserted in the pamphlet, though we notice that some mathematical formulæ are quoted in which the third power of the disturbing force is given. Moreover, by another illustration drawn from the observation of pressure applied to a water-bed, the author concludes that the crest of the tidal wave will always be directly under the moon. We understand this to apply to a uniformly ocean-covered earth. From this it is to be gathered that Mr. Moxly does not consider that the angular distance between the tidal crest and the moon is a function of the depth of the ocean, which in the wave theory of the tides it clearly should be.

But the test of the accuracy of a theory must at last rest in the comparison of its results with those of observation. Mr. Moxly admits this, and therefore a considerable part of the pamphlet is devoted to showing that his theory explains observed facts. Unfortunately,

we are not able to follow the author very clearly in this part of his treatise; but so far as can be seen, the conclusions are inadequate. For instance, the tide at Kerguelen is triumphantly pointed to as proving the coincidence of the tidal crest with the moon's passage over the meridian; but there is no reference to Fiji, where the tide lags some six hours, and the conditions for observation appear equally favourable. We do not propose to follow the author in his discussion of such niceties as the diurnal tide, and prediction for a particular port. If any other remark be needed to indicate the character of the work, it will be found on p. 40: "the swaying of the axis of the tidal spheroid about the axis of the earth's rotation gives us a clear explanation of the production of the phenomenon of nutation."

A Practical Physiology: a Text-Book for Higher Schools. By Albert F. Blaisdell, M.D. Pp. vi + 448. (Boston, U.S.A., and London: Ginn and Co., 1897.)

THIS is not a handbook for the physiological laboratory, but a school lesson-book on elementary anatomy, physiology, hygiene, nursing, and ambulance work. A manual of this kind can hardly be otherwise than superficial, but the information it contains ought to be accurate as far as it goes. In the present case, however, signs of carelessness abound throughout; and the teaching, when not absolutely erroneous, is often misleading. A few instances will suffice to give an idea of the traps which await the unwary student of these pages. Peyer's patches are stated by implication to consist of glands which secrete intestinal fluids. In a figure representing the heart and great vessels, the innominate artery is called the "right subclavian," the left common carotid appears as the "right common carotid," and the left subclavian is labelled the "left common carotid." In a diagram intended to illustrate intestinal absorption, the veins of the mesentery are represented as inosculating with the lacteals. "The power which the pancreatic juice possesses of acting on *all* the food-stuffs appears," it is asserted, "to be due mainly to the presence of a specific element or ferment known as *trypsin*." It is impressed on the student that he should learn how to tie a "reef" knot. But in the figure given to illustrate the directions of the text (which are correct), the author has delineated an unmistakable "granny." After these specimens of erroneous and careless treatment of the subject, it is of minor importance to note that in the repeated denunciations of the use of alcohol and tobacco, inserted, as the preface informs us, in compliance with the laws of most of the States, little or no attempt is made to distinguish between the effects of ordinary and toxic doses of these substances. A book like the present is far more likely to retard than to advance the cause of elementary physiological teaching in schools. F. A. D.

Die Photographische Praxis. Part i. By Prof. H. W. Vogel. (Berlin: Gustav Schmidt, 1897.)

OUR first words must be to congratulate Prof. Vogel that he has recovered from the illness that has delayed for three years the completion of this section of the new edition of his "Handbuch der Photographie." The part now issued is the first part of the third volume, and deals with photographic studios and apparatus (excluding lenses, which are treated of in a previous volume) and the negative processes with collodion and with gelatine emulsions. The chief differences between this and the previous edition are that the practice of photography is now regarded from a general rather than from a merely "professional" point of view, portable apparatus and shutters being considered, and that chapters are given on the use of colour sensitised plates and film photography. Collodion, on account of its continued application in the reproduction processes, retains the premier position; gelatine following with about the same number of pages

devoted to it. Considering the space given to the various branches of the subject, it is surprising that some of the most important advances made during the last ten years or so are not represented. We refer to advances of immediate practical importance, such as the methods of determining the exposure required, recent methods of determining the sensitiveness of plates, and the efficiency of shutters. Intensification also is dealt with in a very inadequate manner. But looking at the volume as a whole, it is a valuable addition to photographic literature, and the opinions and preferences of its distinguished author must always be of interest to English students.

The Miner's Arithmetic and Mensuration. By Henry Davies. Pp. x + 316. (London: Chapman and Hall, Ltd., 1898.)

THIS little volume comprises a collection of questions in arithmetic, the larger number of which are purely and simply arithmetical, ranging from compound addition to cube roots, whilst a smaller number illustrate the mode of solving some of the simpler numerical problems with which the miner has to deal. The work is naturally more or less elementary, and the formulæ given appear to be in most cases fairly correct; in some instances, however, as in the formulæ given under the head of "the barometer," simplicity has been gained only at the expense of accuracy.

The book seems well calculated to serve its purpose, that of enabling the miner to learn how to answer some of the easier numerical questions usually set in the mine manager's examination, without requiring from him any particular mental effort. Whether it is, however, upon the whole a good thing that the pupil, as well as his teacher, should have a collection of rule of thumb methods, that tax merely their memories, without appealing at all to their intelligence, is quite another matter.

Inspector-General Sir James Ranald Martin, C.B., F.R.S. By Surgeon-General Sir Joseph Fayrer, Bart., K.C.S.I., LL.D., &c. Pp. xvi + 203; plate i. (London: Innes and Co., 1897.)

THE name of Sir James Ranald Martin is known to few, and the details of his career to still fewer. It is for this reason that the volume before us will be welcomed by all interested in the birth and development of the medical profession, and sanitary science in India. Sir Ranald Martin left sanitary science, in the broadest sense of the term, and the position of the medical officer in India, in positions very different to those in which he found them. It would have been difficult—indeed, impossible—to have found a better biographer than Sir Joseph Fayrer, whose intimate knowledge of all that concerns medicine in India is absolutely unrivalled. So far as we are aware, the rôle of biographer is new to Sir Joseph; we can only say that from apparently scanty material he has constructed a biography accurate, interesting and instructive.

The biographer, put shortly, describes Sir Ranald's early life and early work in India, following him through the disastrous Burmah campaign 1824–26. Then follows a record of his public services in India. Amongst these, perhaps, the most striking are the inauguration of a system of medical statistics and the sanitary improvement of Calcutta. In 1840, at the age of forty-four, Sir James Ranald Martin returned to London, and took up his residence in Grosvenor Street. From this onwards, with the exception of some time devoted to literary work, which bore fruit in the shape of his treatise "On the influence of tropical climates on European constitutions," he devoted himself entirely to administrative work in connection with medicine and sanitary reform in India. His services in this direction met with but tardy public recognition, for it was not until 1860, sixteen years